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WILLIAM H. EILBERG THREE BALA PLAZA SUITE 501 WEST BALA CYNWYD, PA 19004			EXAMINER WARE, DEBORAH K	
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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

**MAILED**

**JAN 17 2008**

**GROUP 1600**

Application Number: 10/779,828  
Filing Date: February 17, 2004  
Appellant(s): BRAHMBHATT, SUDHIR R.

Sudhir R. Brahmbhatt  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed January 8, 2007, appealing from the Office action mailed August 28, 2006.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

No amendment after final has been filed.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

**WITHDRAWN REJECTIONS**

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner. Upon review of Appellant's arguments, the rejection under 35 U.S.C. 112, first paragraph has been removed.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

US 2003/0080446	Cheng	05-2003
5,985,652	Cheng	11-1999
5,798,254	Cheng	8-1998
EP 0 341 878	Forsyth et al	11-1989

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 103***

Claims 1, 3-6, and 25-26 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Cheng (US 2003/0080446 A1) (A) or Cheng (US PAT NO 5,985,652) (C) or Cheng (US PAT NO 5,798,254) (B) in view of EP 0 341 878 A1.

Claims are drawn to a fermentation process wherein the improvement comprises injecting a stream of substantially pure oxygen into a vessel during fermentation wherein it is the sole reactive gas, from any source external to the vessel, and it is moved through the vessel solely due to pressure in an oxygen supply. Additionally the claims are drawn to the stream as the only gas that is injected continuously into the vessel.

Cheng (A) teaches a fermentation process wherein the improvement comprises injecting a stream of pure oxygen and air into a vessel during fermentation and it is moved through the vessel solely due to pressure in an oxygen supply. Note page 2, column 2, paragraph [0028], all lines and the abstract.

Cheng (C) teaches a fermentation process wherein the improvement comprises injecting a stream of pure oxygen and air into a vessel during fermentation and it is moved through the vessel solely due to pressure in an oxygen supply. See the abstract and column 4, lines 9-40.

Cheng (B) teaches a fermentation process wherein the improvement comprises injecting a stream of pure oxygen and air into a vessel during fermentation and it is moved through the vessel solely due to pressure in an oxygen supply. Note abstract and columns 3, line 26 and 46-47 and column 4, lines 1-18.

EP teaches at page 3, lines 28-35 that the fermenter is injected with an inert gas and substantially pure oxygen, note specifically page 3, lines 5-6 and line 29. Furthermore, at page 5, Table of example 2, it is shown that increased efficiency of the vessel (note at page 5, line 31, 96% utilization of the vessel) and less agitation is needed during the fermentation process (note at page 5, line 160 rpm agitation rate for pumped loop versus 350 rpm pump loop shut off) when a continuous supply of oxygen is provided (i.e. pumped loop operation).

The claims differ from the cited Cheng references in that oxygen is not the sole reactive gas and continuous injection thereof into the vessel is not specifically disclosed.

It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to replace the air in each of the Cheng references with the inert gas disclosed by EP to provide for continuous injection of pure oxygen into the fermenter as the sole reactive gas because the inert gas of EP would have been expected to mix but not react with the secondary gas disclosed by each of the Cheng references, and increased efficiency obtained from its continuous injection into the fermenter as disclosed by EP would have been an obvious modification. No reaction of pure oxygen with the inert gas would have been expected. The pure oxygen is shown in each of the cited Cheng references to move through the vessel solely due to pressure in the oxygen.

The continuous injection of the oxygen would have been expected to be from any source external to the vessel in order to inject it into the vessel, there being some means expected to provide for the pure oxygen supply thereto. Each of the cited references teach mechanically agitating, measuring oxygen concentration and adjusting a flow of oxygen into the fermenter. Furthermore, EP clearly shows the increased efficiency for fermentation process by providing for a continuous supply of oxygen and not air or inert gas. There are no unobvious and unexpected results obtained by continuously injecting oxygen into the fermenter because EP clearly shows the improvements. To continuously inject a fermenter with substantially pure oxygen is an obvious modification well within the purview of an ordinary artisan.

A continuous system is clearly contemplated by the cited prior art, as is continuously injecting oxygen into a fermenter. Further, the fermenter systems are also

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contemplated to perform without agitation as well. Measuring continuously is clearly within the skill of an ordinary artisan. A blower nor a compressor are disclosed by the Cheng references. Also to perform the injecting step without mixing of the oxygen with liquid is clearly an obvious modification of the cited prior art. In the absence of persuasive evidence to the contrary the claims are rendered prima facie obvious over the cited prior art.

#### **(10) Response to Argument**

Appellant initially argues in summary that because both Cheng (representative of each Cheng reference cited above under Evidence) and the European reference (EP Patent as cited above under Evidence) teach injection of two continuous streams their combination cannot yield a process in which pure oxygen is the only reactive gas continuously injected into the vessel. However, the additional stream of the EP reference can be an inert gas and does not need to include air, note page 2, line 46.

Thus, this teaching of the EP reference being an inert gas does suggest that the substantially pure oxygen will be the sole reactive gas to be injected; and hence the only gas that is injected continuously, note further at page 3, lines 6-9 wherein the EP reference discloses that use of substantially pure oxygen will increase the volume of the fermenter and increase culture product productivity as well because no inert nitrogen is added with the oxygen at the continuous injection site.

Therefore, the oxygen is the only gas being injected as disclosed by the EP reference because they clearly disclose that either air or an inert gas (i.e. nitrogen) can be added, or it is at least suggested to be the only one since when the pure oxygen is

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injected the inert nitrogen is disclosed to not be added with the oxygen. Furthermore, the EP reference describes at page 3, lines 28-35 that the pipe loop, which is a continuous means for only oxygen gas supply to the culture, is connected with the main body of the fermenter in order to return oxygenated culture to the main body of the fermenter. The use of substantially pure oxygen to aerate the culture enables the proportion of the main body of the fermenter which is occupied by the culture to be increased as compared with a conventional fermentation process using air to aerate the culture; and no inert gas is added with the oxygen, thus, the oxygen is the only gas being injected, note page 3, lines 5-10. Also note page 3, lines 43-49 wherein it describes that the inert gas functions only to remove waste gas such as carbon dioxide and the function of the substantially pure oxygen is to continuously aerate the culture in the fermentation process.

Furthermore, the argument by Appellant to replace the air stream of Cheng with the inert gas of the EP reference would be a cause of frustration for Cheng is noted, however, both Cheng and EP are performing the same process which is a fermentation process and to select for an inert gas or air is disclosed by EP. Thus, it would have been a mere matter of judicious selection for one of skill to replace the air of Cheng with an inert gas as disclosed by the EP reference. The replacement of air with the inert gas of EP would not have frustrated Cheng and further would have been expected to provide successful results because an inert gas would not be capable of reacting with the oxygen rendering the substantially pure oxygen of Cheng to be the sole reactive gas injected during fermentation.



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Also at page 18 of Appellant's brief, lines 7-8, Appellant admits that oxygen is the sole reactive gas being injected during fermentation of the EP reference. The argument that the stream of oxygen is not the only gas injected continuously with respect to the EP Patent is noted; however, since there is no requirement for mixing an inert gas or air with the substantially pure oxygen, and its only purpose is to remove excess carbon dioxide produced during fermentation it would have been an obvious modification to merely add more pure oxygen to replace the carbon dioxide because the cited prior art combination makes clear the desire in the art to inject substantially pure oxygen during fermentation as the sole reactive gas for increasing productivity of the fermentation process.

One of skill in the art would have been, therefore, motivated to select oxygen and hence provide it as the only gas because, not only is the inert gas or air merely used by the EP reference for removing carbon dioxide, but the volume of gas supplied to the culture for its aeration can be reduced since no air or inert gas is added with the oxygen, also note EP reference at page 3, lines 8-9. Therefore, the argument that the presently claimed invention requires the use of only one continuous stream is noted, however, the EP reference provides the motivation for one of skill in the art to select for only one continuous stream and hence to modify Chengs' fermentation process by injecting only one gas stream is clearly obvious over the cited prior art combination.

The cited prior art recognized that one of the gas streams being added is not intended to be the reactive gas for fermentation and is merely added to remove carbon dioxide as noted above. Thus, to simplify the process by injecting only one stream of

the sole reactive gas as recognized by the cited prior art would have been an obvious modification of the cited prior art. Each of the limitations of the claims are disclosed by the cited prior art or are at least suggested therefrom. The claim features are either specifically disclosed or suggested by the cited prior art combination.

Appellant's arguments that the combination of the cited prior art contradicts the teaching of the references are noted. The requirement of two distinct oxygen-containing gases as disclosed by Cheng (US Pat '254) does not change the claimed featured requirement for the injection of a sole reactive gas, oxygen, and this is the only gas being added whether it is injected once or twice. The two distinct oxygen-containing gases are still an oxygen-containing gas and are not distinct and separate gases one from the other since they are merely two distinct injections of the same gas. Hence oxygen is the only gas being administered for fermentation and for increasing the productivity of the culture and resulting product, therefrom. The EP reference shows Appellants' improvement for reducing the volume of gas required because air or an inert gas is not mixed with the oxygen-containing gas. A fermenter having a reduced volume of gas for aeration of the culture will allow for increased culture product because more culture can grow in the fermenter and hence more product produced, note page 4 of the EP reference, the last table on line 55.

This teaching point is clearly disclosed and supported by Cheng (US Pat '652) wherein two separate injectors for the identical gas are disclosed. Furthermore, Appellant's claims do not necessarily omit the presence of more than one injector for its fermenter vessel, therefore, a first and second substantially pure oxygen gas can be

injected in Appellant's method as well and still be expected to provide successful results. To inject that gas twice does not necessarily mean that it is a different gas per se, but that it is the same gas being injected by two different and distinct injectors.

Likewise while Cheng (US PUB 2003/0080446) does teach that air can be added too; and Appellant alleges that this means there are two different gas streams, each of the Cheng references are combined with the EP and the air stream which can be considered a separate gas stream disclosed by each of the cited reference, although it is not the sole reactive gas for carrying out the fermentation by any of the disclosed methods of the cited prior art, the air stream is replaced by the EP teaching of an inert gas stream.

Therefore, this would suggest to one of ordinary skill in the art at the time the claimed invention was made that the fermentation can be simplified by merely omitting the inert gas stream because its not reacting anyway and only added to remove the carbon dioxide. Thus, by adding more of the sole reactive oxygen gas it will react and also function to remove excess carbon dioxide because not all of the oxygen gas would react when it is added during fermentation since some of it would reach the head space of the vessel.

Also Appellant argues that usage of the term "fluids" and they allege that the plural usage of the term is indictative of a system that provides multiple gases, each containing oxygen and hence all of the Cheng references are based on two distinct oxygen-containing streams. However, the Cheng references are applied each in combination with the EP reference as discussed above. The purpose of Cheng's

fermentation would have been simplified by the replacement of air, which they teach they no longer desire, with the substantially pure oxygen as it is disclosed by each of the cited references as being highly desirable and to be the only reactive gas to be injected during fermentation.

Therefore, this would have suggested to one of ordinary skill in the art that substantially pure oxygen is the only gas necessary to carry out a fermentation process and another gas stream would only complicate the process. The cited prior art of each Cheng reference clearly teach that air is not as desirable and that the injection of substantially pure oxygen provides for increased productivity of the fermentation.

Appellant further argues that replacing the air of Cheng with an inert gas as disclosed by the EP reference is wrong for two reasons: 1) the processes of Cheng and EP reference are different; and 2) any such replacement would ignore Cheng's teaching to support fermentation with two distinct oxygen-containing streams. In order to address the first argument that the processes are different, Cheng may be silent with respect to some of the steps employed by the EP reference, but the test of obviousness under the law is whether the substitution of the air of Cheng with the inert gas of EP reference would have been expected to provide successful results. Therefore, Appellant has provided no argument of an unexpected successful result by the combination of the cited prior art; and furthermore, the instant's claims on appeal do not necessarily omit the steps as described by cited prior art.

Secondly, the argument that the substitution/replacement as described above ignores Cheng's teaching that two distinct oxygen-containing streams are desirable, it

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should be noted that the art also recognizes that air does not provide desirable results and that the substantially pure oxygen does; hence the desire of the art is to inject the sole reactive gas, substantially pure oxygen, note the EP reference and Cheng all disclose injecting substantially pure oxygen. While there may be some differences in how each applied art reference injects the substantially pure oxygen the EP reference clearly teaches, or at least suggests, Appellant's claimed improvement of continuously injecting only one gas stream of a substantially pure oxygen.

Additionally, Appellant argues that to replace air of Cheng with an inert gas of the EP reference would contradict the purpose of the Cheng references, which is to provide two separate oxygen-containing gases. However, the purpose of the Cheng references is the same purpose of the EP reference and that is to inject substantially pure oxygen to increase productivity. Cheng did recognize that air was not as good as pure oxygen for increasing productivity of the fermentation, but they added it to remove carbon dioxide and the EP reference recognizing this also determined an inert gas would work as well. Thus, to simplify further one of ordinary skill in the art would have further recognized based upon the cited prior art that injecting substantially pure oxygen would be sufficient on its own without the need of any other gas stream especially since they discovered that the volume of gas can be reduced. Therefore, this modification of the cited prior is clearly suggested, if not disclosed, and is an obvious modification. Thus, a single source of oxygen would have been expected to provide successful results which hence meets the legal requirement under 35 USC 103.

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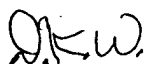
In response to Appellant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Appellant has failed to establish any unexpected successful result and the claims are *prima facie* obvious.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,



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